Sudan University of Science and Technology

Collage of Graduate Studies

Plasma Lipid Profile in Sudanese Women Using Hormonal Contraceptives in Khartoum State

مجموعة الدهون في بلازما الدم لدى السودانيات اللاتي يستخدمن هرمونات منع الحمل بولاية الخرطوم

A dissertation submitted for partial fulfillment for the Requirement of M.Sc. degree in Medical Laboratory Science (Clinical Chemistry)

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى :

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (١) خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ (٢) اقْرَأْ وَرَبُّكَ الْأَكْرَمُ (٣) الَّذِي عَلَّمَ بِالْقَلَمِ (٤) عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ (٥) كَلَّا إِنَّ الْإِنسَانَ لَيَطْغَى (٦) أَن رَّآهُ اسْتَغْنَى (٧) إِنَّ إِلَى رَبِّكَ الرُّجْعَى (٨) أَرَأَيْتَ الَّذِي يَنْهَى (٩) عَبْدًا إِذَا صَلَّى (١٠) أَرَأَيْتَ إِن كَانَ عَلَى الْهُدَى (١١) أَوْ أَمَرَ بِالتَّقْوَى (١٢) أَرَأَيْتَ إِن كَذَّبَ وَتَوَلَّى (١٣) أَلَمْ يَعْلَم بِأَنَّ اللَّهَ يَرَى (١٤) كَلَّا لَئِن لَّمْ يَنتَهِ لَنَسْفَعًا بِالنَّاصِيَةِ (١٥) نَاصِيَةٍ كَاذِبَةٍ خَاطِئَةٍ (١٦) فَلْيَدْعُ نَادِيَهُ (١٧) سَنَدْعُ الزَّبَانِيَةَ (١٨) كَلَّا لَا تُطِعْهُ وَاسْجُدْ وَاقْتَرِب (١٩)

صدق الله العظيم

سورة العلق الآية (1–19)

Dedication

FOR ALL

The World Nations That Fight For The

Life

FOR ALL

The Islamic Nations

The Arabic Nations

And Sudanese Nation That Fight For The

Islamic Word

TO MY

Family

Friends

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Abstract

This is a case control study conducted during the period from March to December 2014 to compare total cholesterol, triglycerides, HDL-c and LDL-c between women using hormonal contraceptives and women who are not.

Sixty apparently healthy women using hormonal contraceptives (20 0f them using progestogen-only pills and 20 of them using injectable progestogen and 20 of them using subdermal smplants) and 60 apparently healthy women who not using hormonal contraceptive as control group. Blood specimens were collected from both groups, and total cholesterol, triglycerides, HDL-c and LDL-c were determined by using auto analyzer (Mindary).

Statistical analysis was done by using SPSS showed a significant increase in means of plasma levels of total cholesterol, triglycerides, low density lipoprotein cholesterol of test group when compared to control group(p=0.00, p=0.000, p=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000, P=0.000) respectively.

The results also showed a significant positive correlation between duration of contraceptives and plasma total cholesterol, triglycerides and LDL-c.

(progestogen-only pills plasma total cholesterol (P=0.000,r=o.912), (progestogen-only pills plasma triglycerides(P=0.000,r=o.932), progestogen-only pills plasma LDL-c (P=0.000,r=o.927), (injectable progestogen plasma total cholesterol (P=0.001,r=o.686), (injectable progestogen plasma triglycerides (P=0.001,r=o.671),

(injectable progestogen plasma LDL-c (P=0.000,r=o.968), (subdermal implants plasma total cholesterol (P=0.000,r=1.000), (subdermal implants plasma triglycerides (P=0.000,r=1.000), (subdermal implants plasma LDL-c (P=0.000,r=1.000).

on the other hand there were negative correlation between HDL-c and duration of hormonal contraceptive (progestogen-only pills plasma HDL-c (P=0.000,r=-o.886), (injectable progestogen plasma HDL-c (P=0.001,r=-o.686), (subdermal implants plasma HDL-c (P=0.000,r=-o.800).

The study results revealed that hormonal contraceptives leads to significant elevation of plasma total cholesterol, triglyceride and LDL-c compared to control group.

Results of study showed that increases in total cholesterol, triglycerides and LDL-c is directly proportional with duration of contraceptives per months and decrease in HDL-c is directly proportional with duration of contraceptives per months.

مستخلص الدراسة

أجريت هذه الدراسة المقطعية في الفترة ما بين مارس 2014حتى ديسمبر 2014 لمقارنة الكولسترول الكلي, ثلاثي الجلسرايد, كولسترول البروتينات الدهنية عالية الكثافة و كلسترول البروتينات الدهنية منخفضة الكثافة بين السودانيات اللاتي يستخدمن هرمون منع الحمل و السودانيات اللاتي لا يستخدمن هرمون منع الحمل كمجموعة ضابطة.

ضمت هذه الدراسة 60 أمراه صحيحة يستخدمن هرمون منع الحمل(20 يستخدمن حبوب هرمون البروقستوجين, 20 يستخدمن ابر البروقستوجين, 20 يستخدمن شرائح البروقستوجين) و60 أمراه صحيحة لا يستخدمن هذا الهرمون (كمجموعة ضابطة), تم جمع عينات الدم من كل المجموعتين وتم قياس الكولسترول الكلي, ثلاثي الجليسرايد, كولسترول البروتينات الدهنية عالية الكثافة وكولسترول البروتينات الدهنية منخفضة الكثافة باستخدام جهاز mindary.

التحليل الإحصائي باستخدام SPSS أظهر أن هنالك زيادة ذات دلاله إحصائية في متوسط الكولسترول الكلي, ثلاثي الجليسرايد وكولسترول البروتينات الدهنية منخفضة الكثافة مقارنة مع المجموعة الضابطة القيمة المعنوية المطلقة (0,000), (0,000), (0,000), (0,000), (0,000), (0,000) (0,000), (0,000), (0,000), (0,000), (0,000), (0,000)و (0,000) علي التوالي.

أيضا أظهرت النتائج أن هنالك علاقة ذات دلاله احصائيه بين مدة استخدام هرمون منع الحمل وبلازما الدم للكولسترول الكلي, ثلاثي الجليسرايد وكولسترول البروتينات الدهنية منخفضة الكثافة (النساء اللاتي يستخدمن حبوب هرمون البروقستوجين الكولسترول الكلي (r=0,912 , p=0,000), ثلاثي الجلسرايد(r=0,932 , p=0,000) و كلسترول البروتينات الدهنية منخفضة الكثافة (r=0,927 , p=0,000), (النساء اللاتي يستخدمن ابر هرمون البروقستوجين الكولسترول الكلي (r=0,686 , p=0,001), ثلاثي الجلسرايد (r=0,671 , p=0,001) و كلسترول البروتينات الدهنية منخفضة الكثافة (r=0,968 , p=0,000), (النساء اللاتي يستخدمن شرائح هرمون البروقستوجين الكولسترول الكلي (r=1,000 , p=0,000), ثلاثي

الجلسرايد (r=1,000 , p=0,000) و كلسترول البروتينات الدهنية منخفضة الكثافة (r=1,000 , p=0,000),

من ناحية أخرى وجد هناك علاقة ذات دلاله إحصائية سالبة بين كولسترول البروتينات الدهنية عالية الكثافة ومدة استخدام هرمون منع الحمل (النساء اللاتي يستخدمن حبوب هرمون البروقستوجين كولسترول البروتينات الدهنية عالية الكثافة (r=-0,886 , p=0,000), (النساء اللاتي يستخدمن ابر هرمون البروقستوجين كولسترول البروتينات الدهنية عالية الكثافة (r=-0,686 , p=0,001) و (النساء اللاتي يستخدمن شرائح هرمون البروقستوجين كولسترول البروتينات الدهنية عالية الكثافة (r=-0,800 , p=0,000).

أظهرت نتائج الدراسة أن هرمون منع الحمل يؤدي إلي ارتفاع في بلازما الدم للكولسترول الكلي, ثلاثي الجليسرايد وكولسترول البروتينات الدهنية منخفضة الكثافة مقارنة مع المجموعة الضابطة.

الزيادة في الكولسترول الكلي, ثلاثي الجليسرايد وكولسترول البروتينات الدهنية منخفضة الكثافة تتناسب تناسب طردي مع مدة استخدام هرمون منع الحمل بالشهور. كذلك أظهرت نتائج الدراسة أن هرمون منع الحمل يؤدي إلي انخفاض في بلازما الدم لكولسترول البروتينات الدهنية عالية الكثافة مقارنة مع المجموعة الضابطة وهذا الانخفاض يتناسب تناسب طردي مع مدة استخدام هرمون منع الحمل بالشهور.

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Abbreviation

ATP:	Adenosine Triphosphate.
BMI:	Body Mass Index.
COC:	Combined Oral Contraceptive.
FSH:	Follicle Stimulating Hormone.
HCP:	Hormonal Contraceptive Pill.
HDL:	High Density Lipoprotein.
IUC:	Intrauterine contraceptive.
ISU:	Intrauterine System.
IUD:	Intrauterine Devices.
LDL:	Low Density Lipoprotein.
LH:	Luteinizing Hormone.
OC:	Oral Contraceptive.
POP:	Progestogene Only Pill.
SD:	Standard Deviation.
SPSS:	Statistical Package for Social Science.
TC:	Total Cholesterol
TG:	Triglycerides

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1. Introduction and literature review

1.1. Introduction

Contraceptive is intentional prevention of conception through use of various devices ,sexual practices, chemicals, drugs , or surgical procedure become a contraceptive if it is purpose to prevent a women from becoming pregnant . There are several types of contraceptives that have been official labeled as such because they have shown reliability in preventing conception from occurring. The pill is common name for oral contraception. It is one the safest , most effective , and popular methods of birth control (speroff, et al. 2005).

The pill is made up of synthetic forms of hormones that naturally occur in females body , progesterone and estrogen. The pill work by stopping the action of hormones that trigger ovulation. There by, preventing the release of egg. It also thickens the cervical mucus, so it makes it hard for sperm to swim. The pill comes in forms: combination pills and progestin. Only pills the pill must be taken daily to sustain the hormones level needed to prevent ovulation.(Mecvoy, et al. 2004).

Oral contraceptive combination birth control pills contain estrogen, which can increase the risk for stroke, heart attack, and blood clot in some women who or have history of heart disease risk factors(such as high blood pressure or unhealthy cholesterol\lipid levels) or cardiac events. The effects of combined oral contraceptives on plasma lipid and lipoproteins have also been studied. An increase in serum triglycerides (TG) (Moore, et al. 1992).

Which are mainly present in very low-density lipoproteins (VLDL), has been reported. Another study reported that the serum cholesterol level was unchanged in women taking low-dose combined oral contraceptives; however the proportion of serum cholesterol carried by high density lipoprotein (HDL) was decreased, while the carried by low density lipoprotein (LDL) and VLDL was increased (Nash, et al. 1979).

Yet another study reported that HDL-cholesterol (HDL-C) levels varied with type and dose of steroid, and the net effect of using combined oral contraceptives on HDL-C depended on its formulation. Decreased plasma LDL-cholesterol (HDL-C) has also been reported (Akerlund, et al. 1997).

1.2. Literature Review

1. 2.1. Contraceptives

Men and women have used contraception, in one form or another, for thousands of years. There is no one method that will suit everyone. And individuals will different types contraception at different stages in their lives (Mecvoy, et al. 2004).

The characteristics of the ideal contraceptive method are:

Highly effective, no side effects, cheap, independent of intercourse, rapidly reversible, widespread availability, acceptable to all cultures and religions, easily distributed, can be administrated by non-healthcare personnel (Moore, et al. 1992).

There is enormous variation in the uptake and use of methods of contraception in different countries worldwide. More than 95 per cent of women in the UK will do not want to become pregnant will use contraception, some couples may use more than one method at the same time, such as the taken of the oral contraceptive pill in conjunction with using condoms. Some method of contraception can only be prescribed by a doctor, whereas other can be used without ever having to seek medical advice (speroff, et al. 2005).

Virtually all method of contraception occasionally fail and some are more effective than others. Failure rate are traditionally expressed as the number of failures per 100 women-years (HWY),i.e. the number of pregnancies if 100 women were to use the method for 1 year.

Failure rate for some method vary considerably, largely because of the potential for failure caused by imperfect use (user failure) rather than an intrinsic failure of method itself (Edmonds, et al 2006).

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1.2.1.1. Classification of Contraception

1. Hormonal contraception

I.Combined oral contraceptive pills

The contraceptive pills contains hormones that thicken cervical mucus, which makes it difficult for the sperm to enter the womb and reach an egg. Also, these pills alter the lining of the womb to make sure an egg cannot implant there should it get fertilized (Moore, et al. 1992).

Combined oral contraceptives cause slight increases in some precoagulant factor and reduce the levels of some natural anticoagulant in particular anti thrombin and proteins. then effect are more marked with third-generation pills(containing degestrol or gestodene) other with second-generation pills(containing levonorgestrel). There are three main types of combined oral contraceptives pills: monophasic, biphasic, triphasic pills (Mcevoy, et al .2004).

Formulation of Combined oral contraceptive pills:

There are many different formulations and brands of COC , most modern preparations contain the oestrogen ethinyl oestradiol in a daily dose of between 20 and 35 µg. those containing lower dosages are associated with slightly poorer cycle control.

Those containing a higher daily dosages, e.g. 50µg ethinyl oestradiol, are generally now only prescribed in special situations, discussed below. Higher dosages of oestrogen are strongly linked to increased risk of

Both arterial and venous thrombosis (Edmonds, et al. 2006).

Most COC contains progestogens that are classed as second and third generation. Monophasic pills contain standard daily dosages of oestrogen and progestogen. Biphasic or triphasic preparations have two or three incremental variations in hormone dose. Current thinking is that biphasic and triphaic preparations are more complicated for women to use and have few real advantages. Most brands contain 21 pills; one pill to be taken daily, followed by a 7-day-free interval. There are also some every-day (ED) preparations that include seven placebo pills that are taken instead of having a pill-free interval. For maximum effectiveness, COC should always be taken regularly at roughly the same time each day (Edmonds, et al 2006).

Mode of action of Combined oral contraceptive pills:

Combined oral contraception acts both centrally and peripherally.

Inhibition of ovulation is by far the most important effect. Both oestrogen and progestogen suppress the release of pituitary follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which prevents follicular development within the ovary and therefore ovulation.Peripheral effects include making the endometrium atrophic and hostile to an implanting embryo and altering cervical mucus to prevent sperm ascending into the uterine cavity.(Trussel, et al. 2007).

Contraindications and Complications of Combined oral contraceptive pills:

Absolute contraindications of Combined oral contraceptive pills includes circulatory diseases (ischemic heart disease ,cerebrovascular accident, significant hypertension, arterial or venous thrombosis, any acquired or inherited pro-thrombotic tendency, any significant risk factors for cardiovascular disease) Acute or sever liver disease, Oestrogen-dependant neoplasm particularly breast cancer and Focal migraine.Relative contraindications of Combined oral contraceptive pills includes Generalized migraine, Long-term immobilization, Irregular vaginal bleeding (until a diagnosis has been made), Less sever risk factor for cardiovascular disease, e.g. obesity, heavy smoking, diabetes (Moore, et al. 1992).

Side effects of Combined oral contraceptive pills:

The vast majority of women tolerate COC well, with few problem.

However, a large number of potential side effects exists, the most important relating to cardiovascular disease. Many minor side effects will settle within a few months of starting COC.(Mcevoy, et al. 2004).

1.2.2 Venous thromboembolism

Oestrogens alter blood clotting and coagulation in a way that indices a pro-thrombotic tendency, although the exact mechanism of this is poorly understood. The higher the dose of oestrogen within COC, the greater the risk of venous thromboembolism .Type of progestogen also affects the risk of VTE, with user of COC containing third-generation progestogens being twice as likely to sustain a VTE (Edmonds, et al 2006).

The risks of VTE are:

-5 per 100 000 for normal population,

-15 per 100 000 for user of second-generation COC,

-30 per 100 000 for user of third-generation COC,

-60 per 100 000 for pregnant women.

Side effect of oral contraceptive pills

Serious side effect are rare in healthy female who do not smoke cigarettes. However, oral contraceptive may cause problem such as liver cancer, non carcenuos liver tumors and blood clots. The most common minor side effects are nausea, vomiting, abdominal cramping or bloating, breast pain, tenderness or swelling, swollen ankles or feet, tiredness and acne. These problem, usually go away as the body adjusts to the drug and don't need medical attention unless they continue or they interfere with normal activities.(Mcevoy, et al. 2004).

1.2.3 Arterial disease

The risk of myocardial infarction and thrombotic stroke in young, healthy women using low-dose COC is extremely small. Cigarette smoking will, however, increase the risk, and any women who smokes must be advised to stop COC at the age of 35 years. Around 1 per cent of women taking COC will become significantly hypertensive and they should be advised to stop taking COC (Edmonds, et al 2006).

1.2.4 Breast Cancer

Advising women about the association between breast cancer and COC is very difficult. Most data do show a slight increase in the risk of developing breast cancer among current COC user (relative risk around 1.24). this is not of great significance to young women, as the background rate of breast cancer is very low at their age (Trussel, et al. 2007).

However, for a women in her forties, these are more relevant data, as the background rate of breast cancer is higher. The same data also show that beyond 10 years after the stopping COC there was no increase in breast cancer risk for former COC user (Collaborative Group, 1996) (Edmonds, et al 2006).

1.2.5 Drug interaction

Some drugs reduce the effect of pill and cause break through bleeding, or increase chance if pregnancy, these include drugs such as rifampicin, barbiturate, phenytoin and carbamazepine, in addition cautions are given about broad spectrum antibiotics, such as ampicilin and deoxycycline, which may cause problems by impaining the bacterial flora responsible for recycling ethinylestradiol from the large bowel.(Archer, et al. 2002).

1.2.6 Positive health benefits

Not all side effects of COC are undesirable. COC user generally have light, pain-free, regular bleeds and therefore COC can be used to treat heavy or painful periods(Edmonds, et al 2006).

It will also improve premenstrual syndrome (PMS) and reduce the risk of pelvic inflammatory disease (PID). COC offers long-term protection against both ovarian and endometrial cancers. It can also be used as treatment for acne(Edmonds, et al 2006).

1.2.7.Vaginal Ring

Is a flexible, soft, transparent ring that contains contraceptive hormones, a women insert the vaginal ring into her vagina and leave it there for 3 weeks (Moore, et al. 1992).

The women removes the ring after 3weeks or week break, during which withdrawal bleeding usually begins. A new ring is inserted into the vagina one week after the last was removed it is only available in one size and required a special fitting or placement (Moore, et al. 1992).

II.Combined hormonal patches

A contraceptive transdermal patch containing oestrogen and progestogen has been developed and releases norelgestromin 150µg and ethinylestradiol 20 µg per 24 hours. Patches are applied weekly for 3 weeks, after which there is a patch-free week. Contraceptive patches has the same risks and benefits COC and, although they are relatively more expensive, may have better compliance (Edmonds, et al 2006).

III.Progesterone-only Contraception

All other types of hormonal contraception in current use in the UK are progestogen-only and share many similar features in the terms of mode of action and side effects. Because they don't contain estrogen, they are extremely safe and can be used if a woman has cardiovascular risk factors. The dose of progestogen within them various from very low to high.the current mode of progestogen-only contraception are progestogen-only pills, subdermal implant implanon, injectables, hormones-releasing intrauterine system. All progestogen-ony method work by a local effect on cervical mucus (making it hostile to ascending sperm) and on the endometrium (making it thin and atrophic), thereby preventing implantation and sperm transport. Higher dose progestogen-only methods will also act centrally and inhibit ovulation(Edmonds, et al 2006).

The common side effects of progestogen-only methods include: erratic or absent menstrual bleeding, functional ovulation cysts, breast tenderness, acne (Edmonds, et al 2006).

a)**Progestogen-only pills**

The progestogen-only pills (pop) is ideal for women who like the convenience of pill taking COC. Although the failure of the pop is greater than that of COC (see table 1.1), it is ideal for women at times of lower fertility. If the pop fails, there is a slightly higher risk of ectopic pregnancy . There is a small selection of brands on the market and they contain the second-generation progestogen norethisterone or norgestrel (or their derivatives) and the third-generation progestogen desogestrel. The POP is taken every day without a break. Particular indication for the POP includes: breastfeeding, older age, cardiovascular risk factors, diabetes(Archer, et al. 2002).

b)**Injectable Proestogen**

Two injectable progestogens are marketed. the Depot methroxyprogesterone acetate 150 mg (Depo-provera or DMPA) and Norethisterone enanthate 200 mg (Noristerat). Most women choose Depo-Provera and each injection lasts around 12-13 weeks. Norethisterone enanthate only lasts for 8 weeks and is not nearly so widely used. Depo-Provera is a highly effective method of contraception and it is given by deep intramuscular injection. Most women who use it develop very light or absent menstruation. Depo-Provera will improve PMS and can be used to treat menstrual problems such as painful or heavy periods (Archer, et al. 2002).

Particular side effects of Depo-Provera are weight gain of around 3 kg in the first year, delay in return of fertility-it may take around 6 months longer to conceive compared to a women who stops COC, persistent menstrual irregularity, very long-term use may slightly increase the risk of osteoporosis(because of low estrogen levels) (Archer, et al. 2002).

c)**Subdermal Implants**

Implanon consist of single silastic rod that is inserted subdermally under local anesthetic into the upper arm. It releases the progestogen etonogestrel 25-75 micrograms daily (the dose released decreases with time), which is metabolized to the third generation progestogen desogestrel. Implanon was introduced into the UK in the late 1990s and has superseded the six-rod implant Norplant, which withdrawn from the market. It is highly effective and, to date, there have been no genuine failure reported with it. It lasts for 3 years and thereafter can be easily removed or a further implant inserted. Implanon is particularly useful for women who have difficulty remembering to take a pill and who want highly effective long-term contraception.There is a rapid return of fertility when it is removed (Sproff, et al . 2005).

2.Intrauterine Contraception

Modern IUDs are highly effective methods of contraception. Fitting an IUD should be performed by trained healthcare personnel only and is a brief procedure associated with mild to moderate discomfort. A fine thread is left protruding from the cervix into the vagina and the IUD can be removed in due course by traction on this thread (Moore, et al. 1992).

An IUD is ideal for women who want a long-term method of contraception independent of intercourse and where regular compliance is not required. IUD protect against both intrauterine and ectopic pregnancy occurs, there is a higher chance than normal that it will be ectopic (Moore, et al. 1992).

Types of Intrauterine Contraception

The original IUDs were large plastic inert devices (lippes loop or sat-T coil), which often caused significantly heavier and more painful menstrual periods. These are no long available, although some women may still have them in situ. Once fitted, they could be lift until the menopause. Most women nowadays will use the smaller copper-bearing IUDs, which are available in various shapes and size. They cause much less menstrual disruption than the older plastic devices. Most copper-bearing IUDs are licensed for between 3 and5 years of use, but many will last longer, possibly up to 10 years.The more copper wire a device has, the more effective it is, and some IUDs have silver-cored copper for added efficacy. An IUDs without a frame which consist of six copper beads on a prolene thread has been developed and is anchored into the uterine funds with a knot (GyneFix). Hormones-releasing devices have also been developed. The levonogestrel-releasing intrauterine system (IUS) has advantages includes highly effective, dramatic reduction in menstrual blood loss, protection against pelvic inflammatory disease and disadvantages includes persisten spotting and irregular bleeding in first few months of use progestogenic side effects, e.g. acne, breast tenderness. (Edmonds, et al 2006).

Mode of action of Intrauterine Contraception

All IUDs induce an inflammatory response in the endometrium which prevents implantation. However copper-bearing IUDs work primarily by a toxic effect on sperm which prevents fertilization. The intrauterine system prevents pregnancy primarily by a local hormonal effect on the cervical mucus and endometrium .(Archer, et al. 2002).

Contraindications of Intrauterine Contraception

The contraindications of IUDs includes previous pelvic inflammatory disease, previous ectopic pregnancy, known malformation of the uterus, copper allergy.(Archer, et al. 2002).

Side effect of copper-bearing IUDs

The side effect of copper-bearing IUDs can lead to increase menstrual blood loss, increased dysmenorrheal, increase risk of pelvic infection in the first few weeks following insertion (Sproff, et al . 2005).

Pelvic infection and IUDs

Although IUDs increase the risk of PID in the first few weeks after insertion, the long-term risk is similar to that of women who are not using any method of contraception. In mutually monogamous relationship, an IUD user has no increased risk of PID. If at IUD user has a partner with a sexually transmitted infection such as Chlamydia or gonorrhea, the IUD will not protect against these infections, in contrast to condoms or the use of a hormonal method of contraception, which do. (Edmonds, et al 2006).

3. Barrier Methods of Contraception

I.Condoms

Male condoms are usually made of latex rubber. There are cheap and are widely available for purchase or free from many clinics. They have been heavily promoted in the safe sex campaign to prevent the spread of sex usually transmitted disease (STDs), particularly human immunodeficiency virus (HIV), and acquired immune deficiency syndrome (AIDS). Condoms of varying sizes and shapes are available. It is important to use condoms that reach European union standard and within their sell-by date. Couple using condom should be aware of availability of emergency contraception in the event of a condom bursting or slipping off during intercourse. Some men and women may be allergic to latex condoms or spermicide, and hypoallergenic latex condoms and plastic male condoms are available. Men must be instructed to apply condoms before any genital contact and to withdraw the erect penis from the vagina immediately after ejaculation (Archer, et al. 2002).

II.Female Barriers

The diaphragm, or Dutch cap, is female barrier used most commonly. Other female barriers includes cervical caps, vault caps an vimules. They should all be used in conjunction with spermicidal cream or gel. Diaphragms are inserted immediately prior to intercourse and should be removed no earlier than 6 hours later (Archer, et al. 2002).

The effective use of a diaphragm requires careful teaching and fitting .

Female barrier offer protection against ascending pelvic infection but can increase the risk of urinary tract infection and vaginal irritation.

Female condoms made of plastic are also available (Femidom). They offer particularly good protection against infection, as they cover all of the vagina and vulva and, being plastic, are less likely to burst. However, many couples find them unaesthetic and they have not achieved widespread popularity. Although a range of spermicidal agents used to be manufactured, only gels and pessaries are still available in the UK. Spermicidal agents should not be used as a contraceptive method on their won: their main role is to make barrier methods more effective(Archer, et al. 2002).

4. Coitus interruptus

Coitus interruptus, or withdrawal, it is widely practiced and obviously dose not required any medical supervision. It is involve removal of penis from vagina immediately before ejaculation take place. Unfortunately, it is not reliable, as pre-ejaculatory secretion may contain millions of sperm young men often find it hard to judge the timing of withdrawal. The use of emergency contraception should be considered if coitus interruptus has taken place. The use of emergency contraception should be considered it coitus interruptus has taken place.(Sproff, et al . 2005).

5. Natural Family Planning

This is an extremely important method of contraception worldwide and may be the only acceptable to some couples for cultural and religious reasons. It involves abstaining from intercourse during the fertile period of the month. The fertile period is calculated by various techniques such as changes in basal body temperature, changes in cervical mucus, changes in the cervix, multiple indices.

Some commercially available kits are available, such as persona, and use complex technology to define fertile periods when abstinence is required . The failure rate of natural methods of family planning are quite high, largely because couple find it difficult to abstain from intercourse when required.The lactation amenorrhea method (LAM) is used by fully breastfeeding mothers. During the first 6 months of infant life, full breastfeeding gives more than 98 per cent contraceptive protection(Archer, et al. 2002).

6. Emergency contraception

The terms 'morning-after pill' and 'poscoital contraception' have now been replaced simply by the term 'emergency contraception' (EC). EC is a method that is used after intercourse has taken place and before implantation has occurred. There is considerable interest in increasing the provision and uptake of EC, particularly in young women, as it is through to have significant potential to reduce the rate of unplanned pregnancies. EC should be considered if unprotected intercourse has occurred, if there has been failure of a barrier method, e.g. a burst condom, or if COC have been forgotten. There are two types of EC in general use (Edmonds, et al 2006).

I.Hormonal emergency contraception

Levonorgestrel, in a single dose of 1.5mg (levonelle), has become the main hormonal method of the EC in the UK. It has to been taken within 72hours of an episode of unprotected intercourse and is more effective earlier it is taken. There is no real contraindications to it is use. The original hormonal EC was a combination of oestrogen and progestogen, but nausea and vomiting were common side effects.

Hormonal EC is not 100 per cent effective but will prevent around three-quarters of pregnancies that would otherwise have occurred. It is available on prescription from a doctor or over the counter in pharmacies, although it is relatively expensive to purchase. It can be used in more than one occasion in a short space of time, but women should consider other more effective method if they are using EC repeatedly. The precise mechanisms of action is not known but probably involve disruption of ovulation or corpus luteal function, depending on the time in the cycle when hormonal EC is taken.(Sproff, et al . 2005).

II.An IUD for emergency contraception

A copper-bearing IUD can be inserted for EC. It is effective up to 5days following the anticipated day of ovulation and can be used to cover multiple episode of intercourse in the same menstrual cycle. The IUD prevents implantation and the copper ions exert an embryo-toxic effect(Archer, et al. 2002).

The normal contraindications to an IUD apply and, if there is a risk of sexually transmitted infection, antibiotic cover should be given. The hormone-releasing IUS has not been shown to be effective for EC and should not be used in this situation (Archer, et al. 2002).

7. Sterilization

Female sterilization and male vasectomy are permanent methods for contraception and are highly effective. They are generally chosen by relatively older couples who are sure that they have completed families. Occasionally, however, individuals who have no children or who, for example, carry a genetic disorder may choose to be sterilized.

The uptake of female sterilization and vasectomy in the UK is relatively high compared to many other European countries, with around 50 per cent of couples over the age of 40 years relying on one or other permanent method. Both female sterilization and vasectomy can be reversed, with subsequent pregnancy rates of about 25 per cent, but reversals are not available on the National Health Service (NHS) in the many parts of the UK (Trussel, et al. 2007).

consent

it is of vital importance that individuals are very carefully counseled (ideally with partner) before sterilization and given written consent to having the procedure performed. Nowadays, consent forms do not ask for the partners written consent. The consent form should clearly indicate that is a permanent procedure but also knowledge that occasionally it can fail. The failure of sterilization and vasectomy is a major of medical litigation (Trussel, et al. 2007).

I.Female sterilization

This involves the mechanical blockage of both fallopian tubes to prevent sperm reaching and fertilizing the oocyte. It can also be achieved by hysterectomy or total removal of both fallopian tubes. Female sterilization should not alter the subsequent menstrual pattern per se, but if a women stops the combined pill to be sterilized, she may find that her subsequent menstrual periods are heavier. Alternatively, if she has an IUD removed at the time of sterilization, she may find her subsequent menstrual periods are lighter. Sterilization in the UK is most commonly performed by laparoscopy under general anesthesia, which enables women to be admitted to hospital as a day case.

Alternative techniques are mini-laparotomy with a small transverse suprapubic incision or through the posterior vaginal fornix (colptomy).Mini-laparotomy is technique of choice when the procedure is done postnatally (the uterus is enlarged and more vascular) and in developing countries where laparoscopic equipment is not available (Trussel, et al. 2007).

Complication of female sterilization

Very occasionally, a women may experience anesthetic problems or there may be damage to intra-abdominal organs during the procedure. Sometimes it is not possible to visualize the pelvic organs at laparscopy due to adhesions or obesity; it may then be necessary to proceed to mini-laparotomy.Female sterilization is highly effective (Trussel, et al. 2007).

Ectopic pregnancy can be a late complication and any sterilized women who misses her period and has symptoms of pregnancy should seek immediate medical advice (Trussel, et al. 2007).

II.Vasectomy

Vasectomy involve the division of the vas deferens on each side to prevent the release of sperm during the ejaculation .It is technically an easier, more straightforward and quicker procedure then female sterilization and is usually performed under local anesthesia.

Various techniques exist to block the vas, and their effectiveness is related primarily to the skill and experience of the operator.

Vasectomy differ from the female sterilization in that is not effective immediately.

Sperm will still be present higher in the genital tract and azoospermia is therefore achieved more quickly if there is frequent intercourse. Men should be advised to hand in two samples of semen at 12 and 16 weeks to see if any sperm are still present. If two consecutive samples are free of sperm, the vasectomy can be considered complete. An alternative form of contraception must be used until that time (Trussel, et al. 2007).

Complication of Vasectomy sterilization

Immediate complications such as bleeding, would infection and haematoma may occur. Occasionally, small lumps may appear at the cut end of the vas as a result of a local inflammatory response. These so-called 'sperm granulomas' may need surgical excision. Some men will develop anti-sperm antibodies following vasectomy(Trussel, et al. 2007). These do not cause symptoms, but if the vasectomy is reversed, pregnancy may not occur because the autoantibodies inactivate sperm. Concerns have been raised for many years about a possible association between vasectomy and the development of both prostate and testicular cancers. Although this issue has received widespread media interest, there is currently insufficient evidence to support an association and change current practice (Trussel, et al. 2007).

1.2.8. Lipid

Lipids are a broad group of naturally occurring molecules including fats, wax and sterols. The main biological functions of lipid include energy storage, as structural component of all membranes, and as important signaling molecules. And the lipid transported through the blood in the lipoproteins (Fahy, et al. 2005).

1.2.8.1 Classification of Plasma Lipids

1. Cholesterol:

Cholesterol is a lipid found in the cell membrane of the cell tissues**,** and it is transported in the blood plasma of all animals. Most of the cholesterol is synthesized by the body and some has dietary origin such as egg, beef and poultry but plants have trace amount of cholesterol. It is insoluble in the blood, but is transported in the circulation system to one of varieties of lipoprotein (Behrman, et al. 2005).

Cholesterol is required to build and maintain cell membrane; some researches indicate that cholesterol may act as antioxidant. It also aid in the manufacture of bile. It is major precursor in the synthesis of vitamin D and of the various steroid hormones, recently, it has been also implicated in the cell signaling processes, where it form a lipid rafts in the plasma membrane. It also reduces the permeability of the cell membrane to hydrogen ions (protons) and sodium ions (Shoji, et al. 2006).

It is either synthesized in the endoplasmic reticulum, or derived from the diet, in which case it is delivered by the blood stream in the low density lipoprotein-cholesterol LDL-C is primarily synthesized from acetyl coA through 3-hydroxy-3- methylgluyaryl-coenzyme A reductase (HMG-coA reductase) pathway in many cells and tissues (Hanis, et al. 2001).

Condition with elevated concentration of oxidized LDL-C particles, especially "small dense LDL-C" particles, are associated with atheroma formation in the walls of arteries condition known as atherosclerosis,

which is the principle cause of coronary heart disease (CHD) and other form of cardiovascular disease (Haines, et al. 2001).

In contrast, HDL-C particles (especially large HDL) have been identified as a mechanism by which cholesterol and inflammatory mediators can be removed from atheroma increased concentration of HDL-C correlate with lower rate of atheroma progression and even regression. The relation of cholesterol to CHD termed "lipid hypothesis (Haines, et al 2001).

2. Triglycerides

Are ester derived from glycerol and three fatty acids usually three different (Nelson, et al. 2000).

Fatty acids including both saturated and unsaturated molecules (Bishop, et al. 2005).

It is main constituent of vegetable oil and animal fat. The source of triglycerides in the body can be either exogenous (dietary) or endogenous (synthesized) on the liver and the tissues. Triglyceride molecules allow the body to compactly store long carbon chain (fatty acids) for energy that can be used (Nelson, et al. 2000).

3. Phospholipids

Phospholipids are a major component of all biologically membrane, a large with glycolipids, cholesterol and proteins. Understanding of the aggregation properties of these molecules is known as lipid polymorphism and form parts of current academic research (Berg, et al 2002).

4. Free Fatty Acids

The uncombined fatty acids or free fatty acids may come from the breakdown of the triglyceride into it is component (fatty acids and glycerol) (Longmore, et al. 2007).

As fats are insoluble in water, they must be bound to an appropriate region in the plasma protein albumin for transport around the body. The levels of free fatty acids in the blood are limited by the number of albumin binding sites available, free fatty acids are important sources of fuel for many tissues since they can yield relatively large quantities of ATP. Many cells types use either glucose or fatty acids for this purpose in a particular, heart and skeletal muscles prefer fatty acids. The brain cannot use fatty acids as source of fuel (Longmore, et al. 2007).

It is relies on glucose, or ketone bodies produced in the liver by fatty acids metabolism during starvation, or during period of low carbohydrate intake (Longmore, et al. 2007).

5. Lipoproteins

It is includes any of lipid. Protein complexes in which lipids are transported in the blood, lipoprotein particles consist of a spherical hydrophobic core of triglyceride or phospholipids, cholesterol, and apolipoprotein, lipoprotein in the blood, a water medium, carry fats around the body (Arneson, et al. 2007).

Classification of Lipoprotein:

General categories of lipoprotein, listed in order from large and less dense (more fats than protein) to smaller and more dense (more protein less fats) includes:

I. Very low density lipoproteins VLDL

It is assembled in liver from cholesterol and apolipoprotein. It is converted in the blood stream into low density lipoprotein (LDL-C). VLDL particles have a diameter of 30-40 nm. VLDL-C transport endogenous products where chylomicron transports exogenous (dietary) products. VLDL-C transport endogenous triglyceride, phospholipids, cholesterol and cholesterol ester (Bishop, et al. 2005). It function as body internal transport mechanism of lipid and it is level have been correlated with accelerated rates, of atherosclerosis, and are elevated in a number of disease and metabolic state (Bishop, et al 2005).

II.Intermediate density lipoproteins IDL

This is class of lipoprotein responsible for transport of cholesterol to extra hepatic tissue. They are formed in the circulation when very low density are degraded first to IDL and then to IDL-C by the gain and loss of specific apolipoprotein and the loss of most of liver triglyceride, IDL-C are taken up and catabolized by the both the liver and extra hepatic tissue by specific receptor-mediated endocytosis (Bishop, et al. 2005).

III. Low density lipoprotein LDL

It is belong to lipoprotein particles family, it is size is approximately 22 nm but since LDL-C particles contain a changing number of fatty acids they actually have a different mass and size distribution. LDL-C transport cholesterol and triglyceride from the liver to the peripheral tissues. LDL-C is formed as VLDL-C lipoprotein lose triglyceride through the action of lipoprotein lipase (LPL) and become smaller and dense, containing higher proportional of cholesterol (Segrest, et al. 2001).

Because LDL-C transport cholesterol to the arteries and can be retained there by the arterial proteoglycans starting the formation of plaque, increased level are associated with atherosclerosis and thus heart attack, stroke and peripheral vascular diseases. For this reasons, cholesterol inside LDL-C lipoprotein is often called "Bad cholesterol". Increasing evidence has revealed that the concentration and the size of LDL-C particles more powerfully related to the degree of arthrosclerosis progression then the concentration of cholesterol contained within the all LDL-C particles (Segrest, et al. 2001).

LDL-C carries a risk of cardiovascular disease when it invade the endothelium and become oxidized since the oxidized form more easily retained by proteoglycans. Because LDL-C appear to be harmless until oxidized by free redicals, it is postulated that the ingesting antioxidants and minimizing free redicals exposure may reduce LDL-C contribution to atherosclerosis (Teissedre, et al. 2009).

VI. High density lipoprotein HDL

This is a class of lipoprotein, varying somewhat in their size (8-11 nm in diameter), that carry fatty acids and cholesterol from the body's tissue to the liver. About thirty percent of blood cholesterol is carried by HDL-C. Moreover, HDL-C serve as potent endogenous inhibit of inflammation, platelet adhesion that HDL-C can remove cholesterol from the atheroma arteries and, transport it back to the liver for excretion or re-utilization which is main reason why. HDL-C bound cholesterol is sometimes called "good cholesterol". HDL-C is smallest of lipoprotein. They are the greatest one because they contain high proportion of protein (Navab, et al. 2001).

Epidemiological studies have shown that high concentration of HDL-C (over 60 mg/dl) have protective value against cardiovascular disease such as ischemic stroke and myocardial infarction. Low concentration of HDL-C (below 40 mg/dl) for men, below 50 mg/dl for women) are positive risk factor for these atherosclerosis disease (Baylor, et al. 2001).

1.3.Rationale:

There is enormous variation in the uptake and use of methods of contraception in different countries worldwide.

There are different studies reported the effect of contraceptives on plasma lipid and lipoprotein.

In Sudan there is no data published concerning level of lipid profile among women using hormonal contraceptives. That is why we attempt to do this study.

1.4. Objectives:

1.4.1 General Objective

To assess the plasma lipid profile in Sudanese women using hormonal contraceptives.

1.4.2 Specific Objectives

1-To compare the plasma levels of total cholesterol, triglycerides, high density lipoprotein- cholesterol, low density lipoprotein- cholesterol between women using different types of hormonal contraceptives and women who are not.

2- To correlate between levels of cholesterol, triglycerides, HDL-c, LDL-c of women who are use hormonal contraceptives with their duration of using contraceptives.

Chapter Two

2.Materials and Methods

2.1. Materials

2.1.1.Study design: This is a descriptive, case control study.

2.1.2.Study area: The study was conducted in Sudan in Khartoum.

2.1.3.Study Population: Sixty women using contraceptives were enrolled in this study as a test group (n=60) and apparently healthy women not using contraceptives as control group (n=60) both test group and control group were matched for age (from 25-35 years).

Inclusion criteria: Apparently healthy Sudanese women using hormonal contraceptives**.**

Exclusion criteria: Women with diabetes mellitus, hypertension, Kidney disease, thyroid disorder, obstructive liver disease or having present history of any disease which may affect the level of lipids.

2.1.4.Ethical considerations: Participants who informed about the study and accepted to be volunteers are included.

The objectives of the study were explained to all individuals participating in the study.

2.1.5.Sample: A bout 2.5ml of fasting venous blood was collected from each participants, using sterile disposable plastic syringes using 70% alcohol for cleaning the skin.

2.1.6. Data Analysis: The data collected in this study was analyzed using SPSS computer analysis program. The means and standard deviation of the plasma total cholesterol, triglyceride, high density lipoprotein, low density lipoprotein were comparison (p-value less than or equal 0.05 is considered to be significant).

Linear regression analysis was used to assess correlation between the duration of use of contraceptives (in months).

2.1.7. Quality control: The precision and accuracy of all method used in this study were check each time a patch was analyzed by including commercially prepared control sera.

2.2. Methods:

2.2.1. Estimation of Plasma Total Cholesterol:

Reaction Principle:

By the catalysis of CHE and CHO, cholesterol ester is catalyzed to yield H_2O_2 which oxidates 4-Aminoantipyrine with phenol to form a colored dye of quinoneimine. The absorbency increase is directly proportional to the concentration of cholesterol. (appendix II).

2.2.2Estimation of Plasma triglycerides

Reaction Principle:

Through a sequence of enzymatic catalysis steps by lipase, GK and GPD, triglycerides is catalyzed to yield H_2O_2 which oxidates 4-Aminoantipyrine with phenol to form a colored dye of quinoneimine. The absorbency increase is directly proportional to the concentration of triglycerides. (appendix III).

2.2.3Estimation of Plasma High Density Lipoprotein-cholesterol (HDL-c):

Reaction Principle:

The system monitors the change in the absorbance at 600 nm. This change in the absorbance is directly proportional to the concentration of cholesterol in the sample and is used by the system to calculate and express the HDL-cholesterol concentration. (appendix IV).

2.2.4.Estimation of Plasma LOW Density Lipoprotein-cholesterol (LDL-c):

Reaction Principle:

The system monitors the change in the absorbance at 600 nm. This change in the absorbance is directly proportional to the concentration of cholesterol in the sample and is used by the system to calculate and express the LDL-cholesterol concentration. (appendixV).

CHAPTER
Three

3.Results

One hundred and twenty Sudanese females were included in this study to evaluate the levels of plasma total cholesterol and triglycerides and HDL-c and LDL-c, 60 apparently healthy women using hormonal contraceptive (20 0f them using progestogen-only pills and 20 of them using Injectable progestogen and 20 of them using Subdermal Implants) and 60 apparently healthy women who are not using this hormonal contraceptive. After estimation of parameters by autoanalyzer, the statistical analysis was done by using SPSS computer program and the result were as follow:

Table 3.1: shows a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using oral contraceptives and control group.

Table 3.2: shows a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using injectable contraceptives and control group.

Table 3.3: shows a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using subdermal implant contraceptives and control group.

Figure 3.1 a scatter plot shows a significant positive correlation (P=0.000,r=0.912) between T.cholesterol and duration of Sudanese women using oral contraceptive.

Figure 3.2 a scatter plot shows a significant positive correlation (P=0.000,r=0.932) between Triglyceride and duration of Sudanese women using oral contraceptive.

Figure 3.3 a scatter plot shows no significant correlation (P=0.000,r=-0.886) between HDL-c and duration of Sudanese women using oral contraceptive.

Figure 3.4 a scatter plot shows a significant positive correlation (P=0.000,r=0.927) between LDL-c and duration of Sudanese women using oral contraceptive.

Figure 3.5 a scatter plot shows a significant positive correlation (P=0.001,r=0.686) between T.cholesterol and duration of Sudanese women using injectable contraceptive.

Figure 3.6 a scatter plot shows a significant positive correlation (P=0.001,r=0.671) between Triglyceride and duration of Sudanese women using injectable contraceptive.

Figure 3.7 a scatter plot shows no significant negative correlation (P=0.001,r=-0.686) between HDL-c and duration of Sudanese women using injectable contraceptive.

Figure 3.8 a scatter plot shows a significant positive correlation (P=0.000,r=0.968) between LDL-c and duration of Sudanese women using injectable contraceptive.

Figure 3.9 a scatter plot shows a significant positive correlation (P=0.000,r=1.000) between T.cholesterol and duration of Sudanese women using subdermal implant.

Figure 3.10 a scatter plot shows a significant positive correlation (P=0.000,r=1.000) between Triglyceride and duration of Sudanese women using subdermal implant.

Figure 3.11 a scatter plot shows no significant correlation (P=0.000,r=-0.800) between HDL-c and duration of Sudanese women using subdermal implant.

Figure 3.12 a scatter plot shows a significant positive correlation (P=0.000,r=1.000) between LDL-c and duration of Sudanese women using subdermal implant.

Table 3.1: a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using oral contraceptives pills and control group.

Variable	Mean± SD	P Value
TC (mg/dl) (test group)	162.25±0.761	0.000
TC (mg/dl) (control group)	123±2.646	
TG (mg/dl) (test group)	102.20±2.167	0.000
TG (mg/dl) (control group)	73.35±2.498	
HDL-c (mg/dl) (test group)	30.70±0.470	0.000
HDL-c (mg/dl) (control group)	36.25±0.444	
LDL-c (mg/dl) (test group)	92.10±1.165	0.000
LDL-c (mg/dl) (control group)	63.50±2.646	

** Independent sample T test was used for comparison, value considered significant at level ≤ 0.05.

Table 3.2: a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using injectable contraceptives and control group.

Variable	Mean± SD	P Value
TC (mg/dl) (test group)	143.90±0.641	0.000
TC (mg/dl) (control group)	123.50±2.646	
TG (mg/dl) (test group)	93.85±0.671	0.000
TG (mg/dl) (control group)	73.05±2.498	
HDL-c (mg/dl) (test group)	32.10±0.641	0.000
HDL-c (mg/dl) (control group)	36.25±0.444	
LDL-c (mg/dl) (test group)	84.06±0.646	0.000
LDL-c (mg/dl) (control group)	63.50±2.646	

** Independent sample T test was used for comparison, value considered significant at level ≤ 0.05.

Table 3.3: a comparison between means of plasma total cholesterol and triglyceride and HDL-c and LDL-c in Sudanese women using subdermal implant contraceptives and control group.

Variable	Mean± SD	P Value
TC (mg/dl) (test group)	134.90±1.518	0.000
TC (mg/dl) (control group)	123±2.646	
TG (mg/dl) (test group)	84.90±1.167	0.000
TG (mg/dl) (control group)	73.35±2.498	
HDL-c (mg/dl) (test group)	34.35±0.489	0.000
HDL-c (mg/dl) (control group)	36.25±0.444	
LDL-c (mg/dl) (test group)	74.90±1.518	0.000
LDL-c (mg/dl) (control group)	63.50±2.646	

** Independent sample T test was used for comparison, value considered significant at level ≤ 0.05.

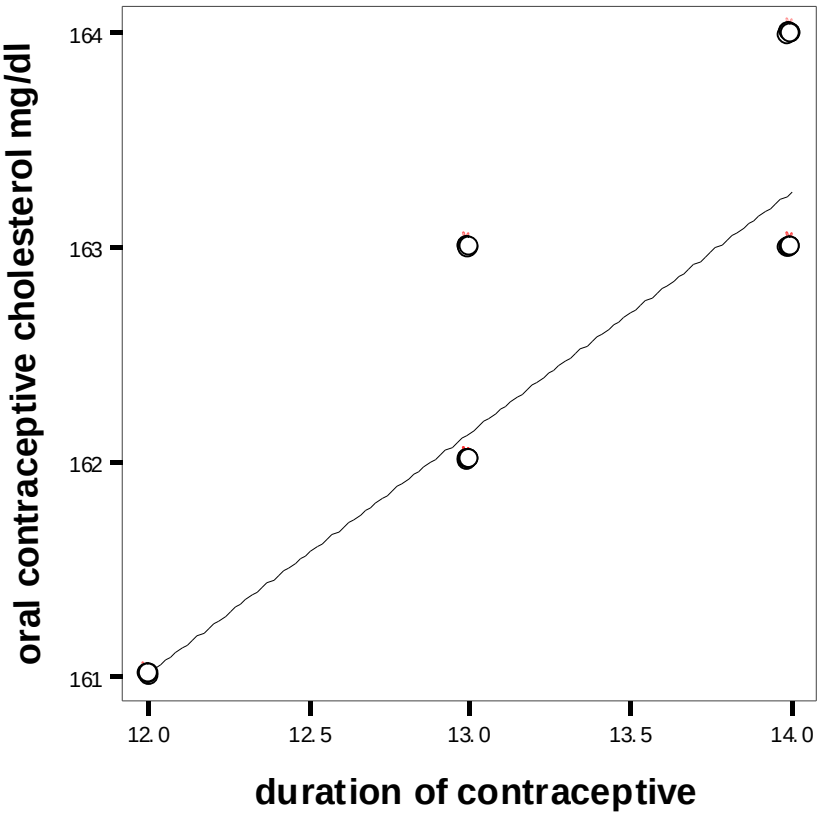

Figure 3.1: correlation between total cholesterol and duration of using oral contraceptive. (r=0.912, P=0.000).

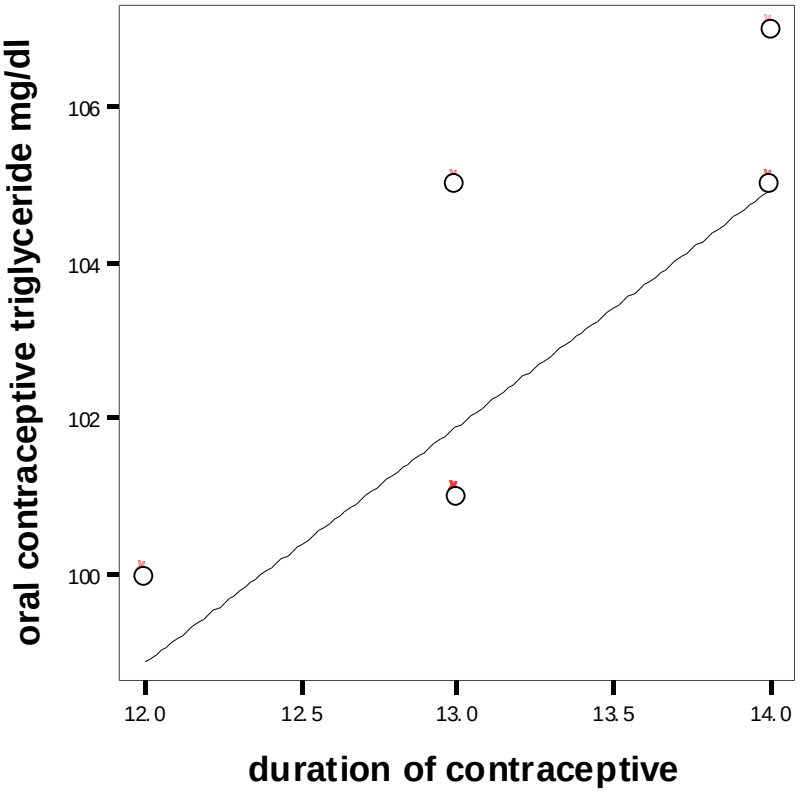

Figure 3.2: correlation between triglycerides and duration of using oral contraceptive. (r=0.932, P=0.000).

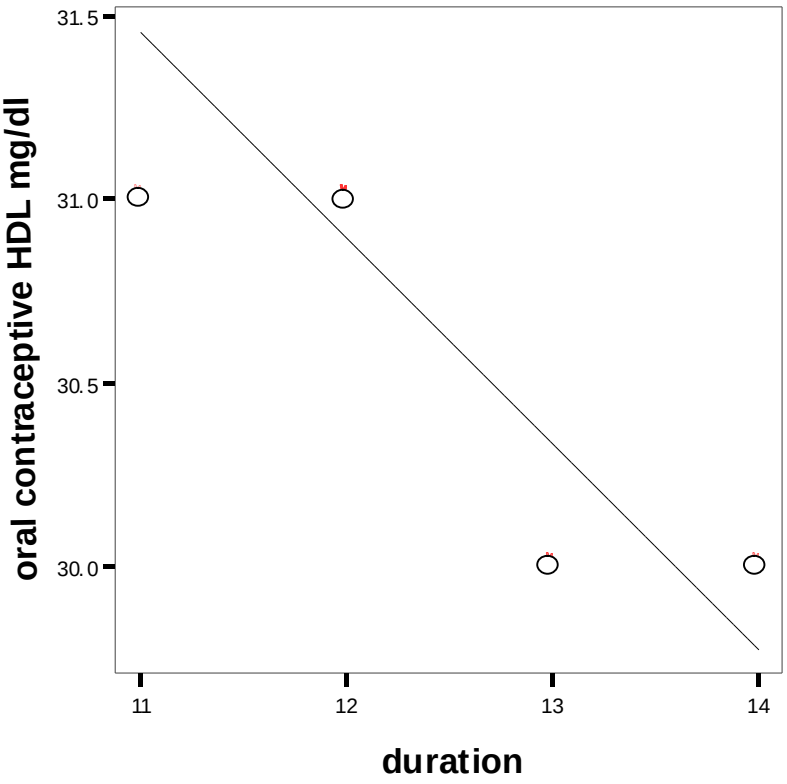

Figure 3.3: correlation between HDL-c and duration of using oral contraceptive. (r=-0.886, P=0.000).

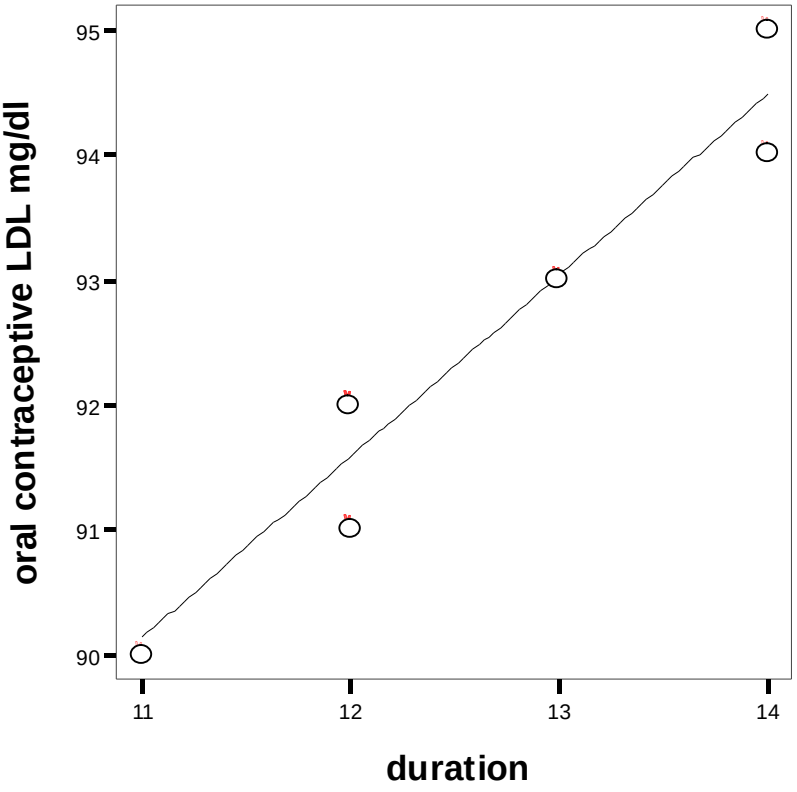

Figure 3.4: correlation LDL-c and duration of using oral contraceptive. (r=0.927, P=0.000).

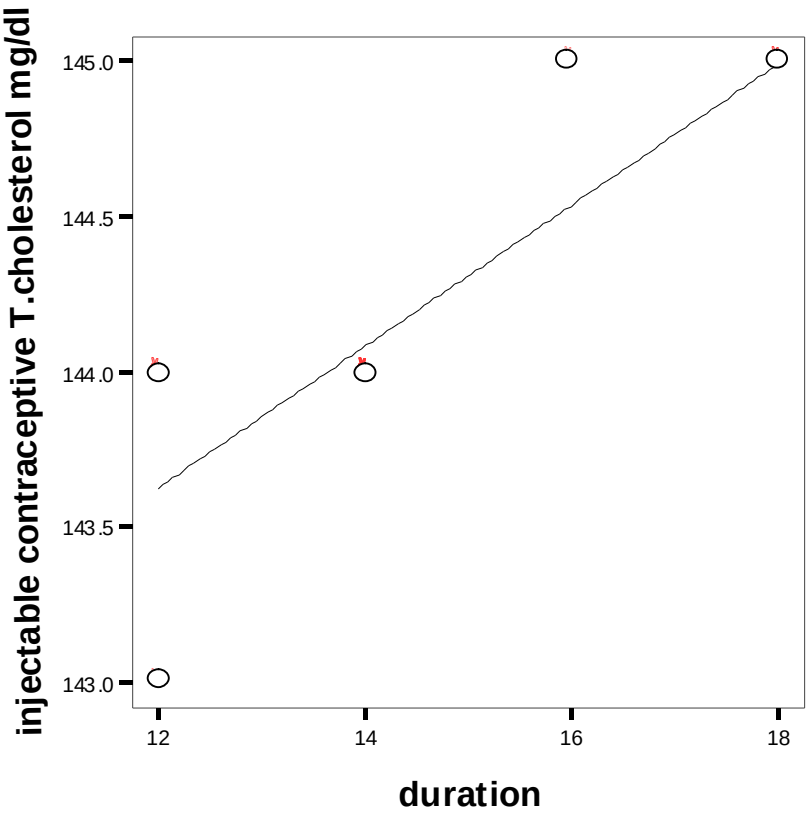

Figure 3.5: correlation between total cholesterol and duration of using injectable contraceptive. (r=0.686, P=0.001).

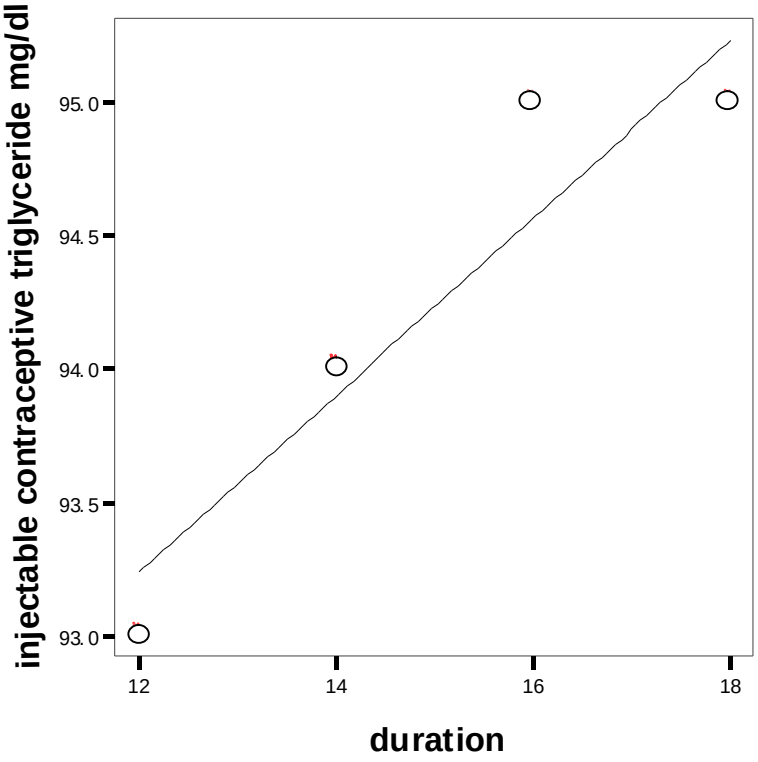

Figure 3.6: correlation between triglycerides and duration of using injectable contraceptive. (r=0.671, P=0.001).

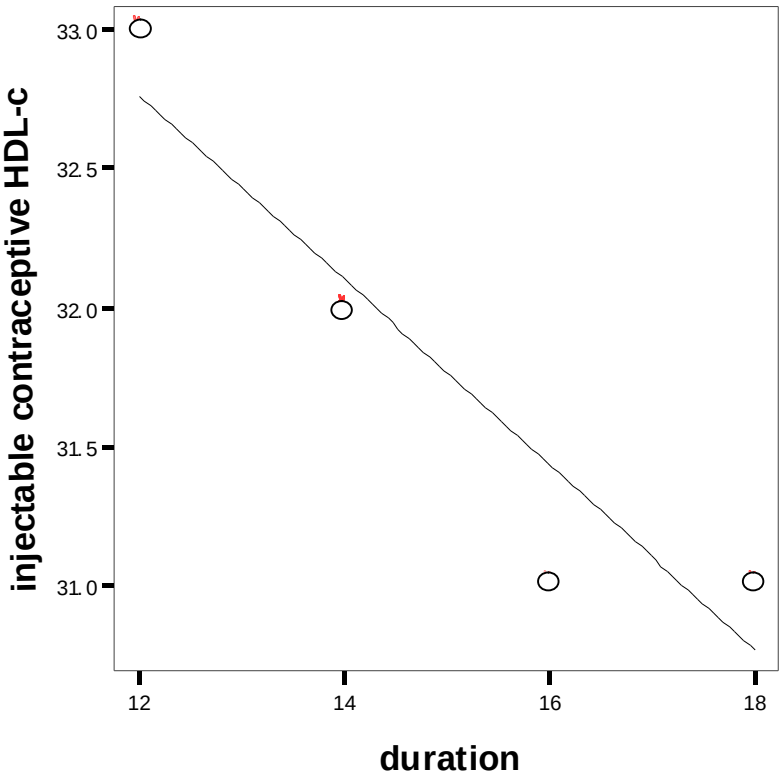

Figure 3.7: correlation between HDL-c and duration of using injectable contraceptive. (r=-0.686, P=0.001).

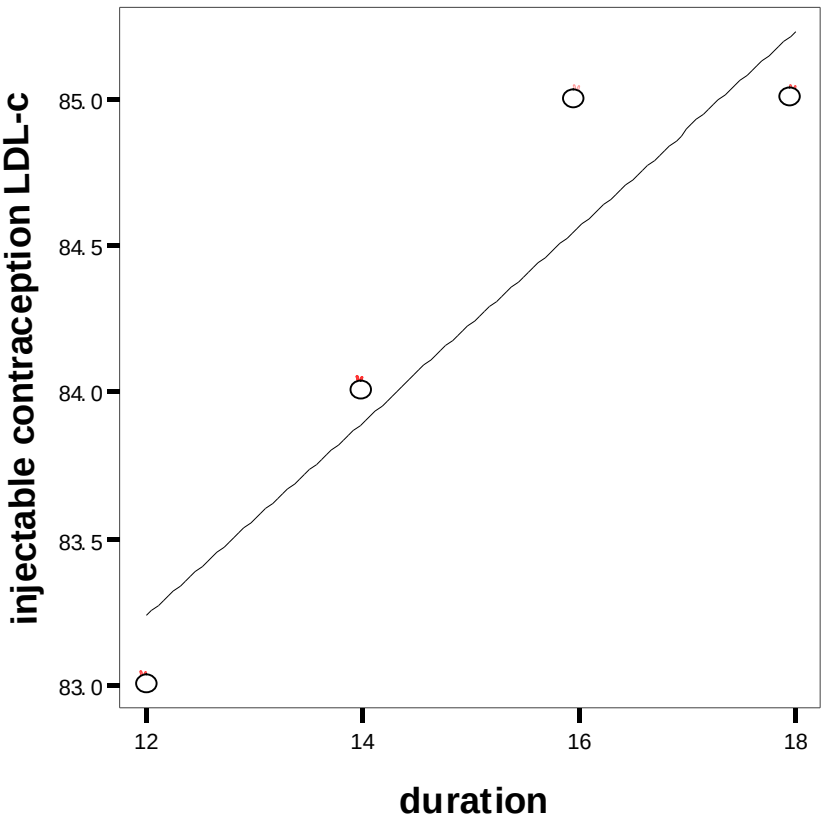

Figure 3.8: correlation between LDL-c and duration of using injectable contraceptive. (r=0.968, P=0.000).

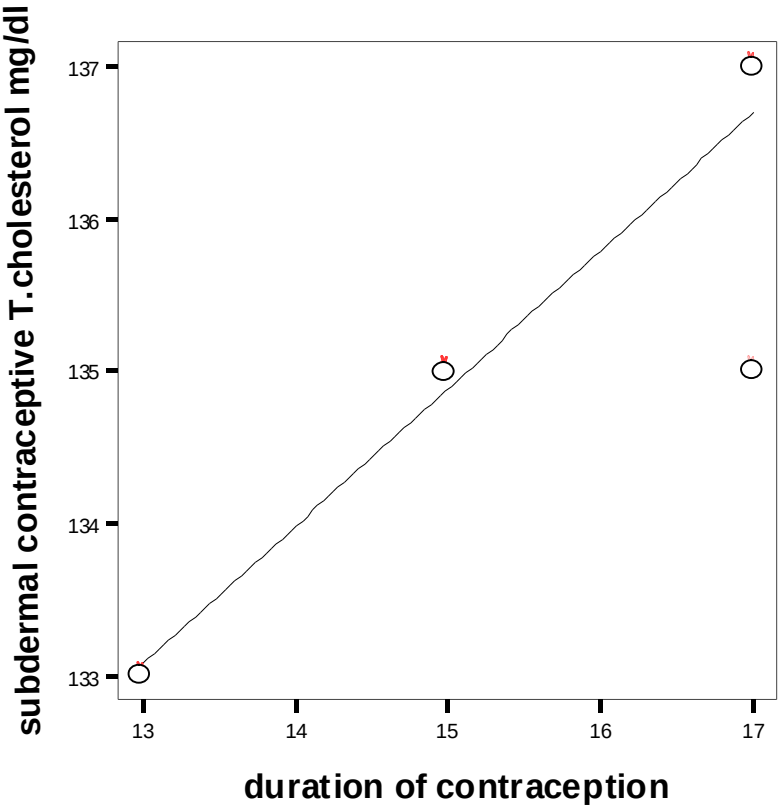

Figure 3.9: correlation between total cholesterol and duration of using subdermal implant contraceptive. (r=1.000, P=0.000).

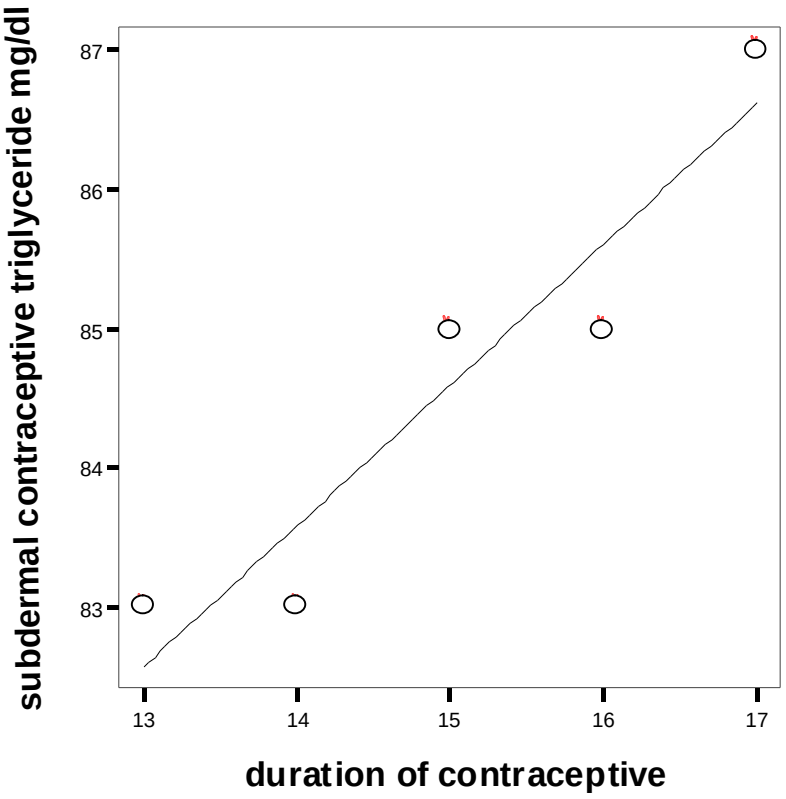

Figure 3.10: correlation between triglycerides and duration of using subdermal implant contraceptive. (r=1.000, P=0.000).

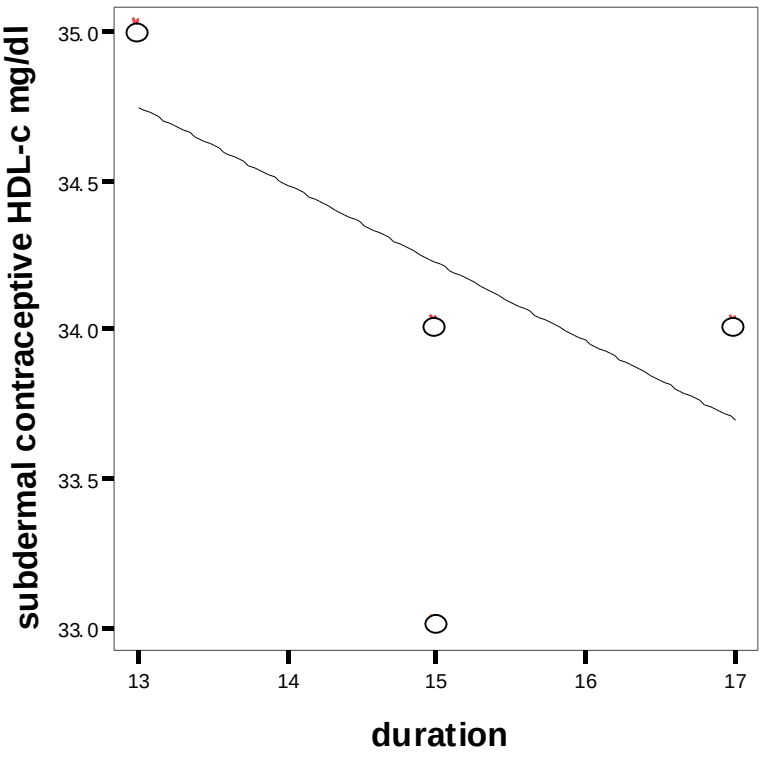

Figure 3.11: correlation between HDL-c and duration of using subdermal implant contraceptive. (r=-0.800, P=0.000).

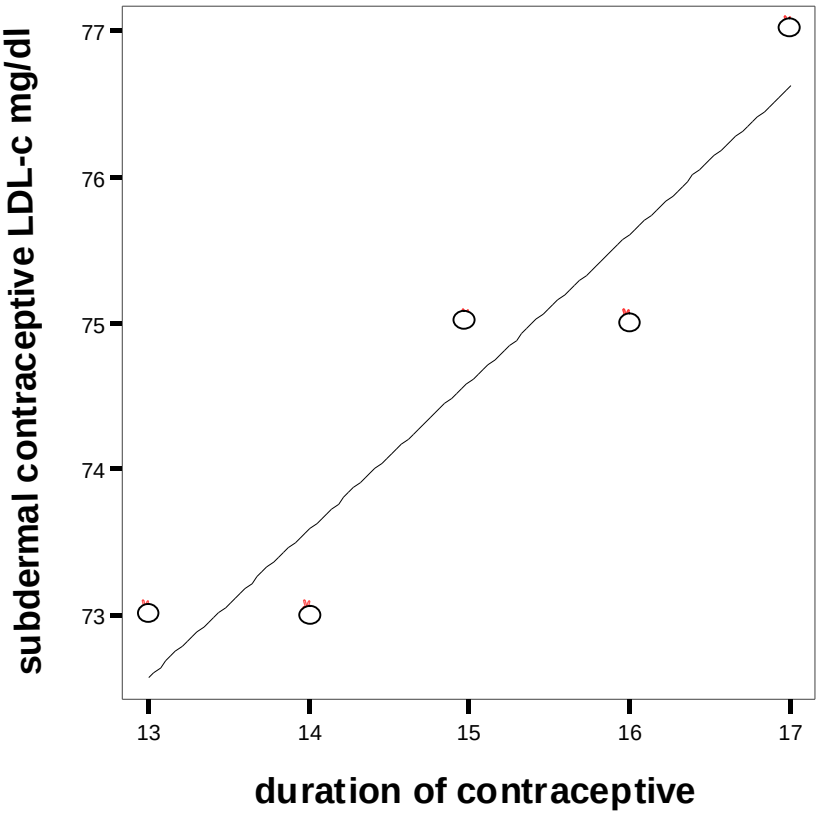

Figure 3.12: correlation between LDL-c and duration of using subdermal implant contraceptive. (r=1.000, P=0.000).

Chapter Four

4. Discussion, Conclusion and Recommendation

4.1.Discussion

contraceptive is intentional prevention of conception through the use of various devices, sexual practices, chemicals, drugs or surgical procedures becomes a contraception if it is purpose is to prevent a women from becoming pregnant (Sproff, et al. 2005).

The present study aimed to study the effect of hormonal contraceptives on plasma lipids (total cholesterol, triglycerides, high density lipoprotein- cholesterol, low density lipoprotein- cholesterol) in women using hormonal contraceptives as test group and women who are not as control group.

Statistical analysis showed that significant increase in total cholesterol among women using oral contraceptive pills the p value 0.000, significant increase in total cholesterol among women using injectable contraceptive the p value 0.000, significant increase in total cholesterol among women using subdermal implant contraceptive the p value 0.000, and significant increase in triglycerides among women using oral contraceptive the p value 0.000, significant increase in triglycerides among women using injectable the p value 0.000, significant increase in triglycerides among women using subdermal implant contraceptive the p value 0.000, significant increase in LDL-c among women using oral contraceptive pills the p value 0.000, significant increase in LDL-c among women using injectable the p value 0.000, significant increase in LDL-c among women using subdermal implant contraceptive the p value 0.000 compared to women who are not.

The results also showed that significant decrease in HDL-c among women using oral contraceptive pills the p value 0.000, significant decrease of HDL-c among women using injectable contraceptives the p value 0.000, significant decrease in HDL-c among women using subdermal implant contraceptive the p value 0.000 compared to women who are not, This agree with results done by (Asara GA in a Ghanaian Community (2014); revealed that there is a significant increase in total cholesterol among women using hormonal contraceptives the p.value 0.002, significant increase in triglycerides among women using hormonal contraceptives the p.value 0.026 and significant increase in LDL-c among women using hormonal contraceptives the p.value 0.004 compared to women who are not. Also agree with results done by (F. Naz (2012); revealed that there is a significant differences among user of OCs compared to non-users. Total cholesterol (242.92 mg/dl), HDL-c(58.65 mg/dl), LDL-c (115.84 mg/dl), and triglycerides (105.56 mg/dl) were significantly higher compared to the non-users.

4.2.Conclusion

1- levels of plasma total Cholesterol, triglycerides and low density lipoprotein increased by using hormonal contraceptives and this increasing is directly proportional with duration of using hormonal contraceptives.

2- HDL-c level decreased by using hormonal contraceptives and this decreasing is directly proportional with duration of using hormonal contraceptives.

4.3.Recommendations:

From this study, we can recommend that:

1- Examination and tests needed before initiation of contraceptive method, examination like blood pressure, clinical breast examination, laboratory tests like lipids, thrombotic mutation.
2- Routine follow up after contraceptive initiation is recommended to be done.

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Appendices

بسم الله الرحمن الرحيم

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Assessment of Plasma Lipid Profile in Women using Hormonal Contraceptives in Khartoum State 2014

(Questionnaire)

General Information:

Name…….. Date……
Serial Number……. Age…….

Clinical Information:

1. Types of hormonal contraceptives:

I- Oral contraceptive Pills Use ☐

II- Injection Contraceptive Use ☐

III- Subdermal Implant ☐

2. Duration of using hormonal contraceptives per months ☐

3. History of Diseases:

Hypertensions ☐ Diabetes mellitus ☐
Renal Diseases ☐ Heart Diseases ☐

4. Investigation Results:

-Plasma Cholesterol…… mg\dl
-Plasma Triglyceride……...mg\dl
-Plasma HDL…….... mg\dl
-Plasma LDL……mg/dl